# UNITED STATES PATENT AND TRADEMARK OFFICE

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| 10/753,499 | 01/09/2004 | Kia Silverbrook | DAM07US | 7874 |

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| EXAMINER |
|---|
| ZHU, RICHARD Z |

| ART UNIT | PAPER NUMBER |
|---|---|
| 2609 | |

| SHORTENED STATUTORY PERIOD OF RESPONSE | MAIL DATE | DELIVERY MODE |
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

PTOL-90A (Rev. 10/06)

| | Application No. | Applicant(s) |
|---|---|---|
| **Office Action Summary** | 10/753,499 | SILVERBROOK, KIA |
| | Examiner | Art Unit | |
| | Richard Z. Zhu | 2609 | |

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**.        2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-22* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-22* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *09 January 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☒ All   b)☐ Some * c)☐ None of:

      1.☒ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____ .

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date *11/15/2004*.

4) ☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____ .

# DETAILED ACTION

## *Priority*

1.  Acknowledgment is made of applicant's claim for foreign priority based on an

application filed in Australia on January 16th of 2003. Certified copy of the Australian

Application had been received on January 17th of 2006.

## *Claim Objections - 37 CFR 1.75*

2. The following is a quotation of 37 CFR 1.75(a):

The specification must conclude with a claim particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention or discovery.

3. The following is a quotation of 37 CFR 1.75(d)(1):

The claim or claims must conform to the invention as set forth in the remainder of the specification and the terms and phrases used in the claims must find clear support or antecedent basis in the description so that the meaning of the terms in the claims may be ascertainable by reference to the description.

4. The following is a quotation of 37 CFR 1.75(c):

One or more claims may be presented in dependent form, referring back to and further limiting another claim or claims in the same application. Any dependent claim which refers to more than one other claim ("multiple dependent claim") shall refer to such other claims in the alternative only. A multiple dependent claim shall not serve as a basis for any other multiple dependent claim. For fee calculation purposes under § 1.16, a multiple dependent claim will be considered to be that number of claims to which direct reference is made therein. For fee calculation purposes also, any claim depending from a multiple dependent claim will be considered to be that number of claims to which direct reference is made in that multiple dependent claim. In addition to the other filing fees, any original application which is filed with, or is amended to include, multiple dependent claims must have paid therein the fee set forth in § 1.16(j). Claims in dependent form shall be construed to include all the limitations of the claim incorporated by reference into the dependent claim. A multiple dependent claim shall be construed to incorporate by reference all the limitations of each of the particular claims in relation to which it is being considered.

Claim 8 is objected to under 37 CFR 1.75(d)(1) as failing to conform to the invention as set forth in the remainder of the specification. Claim 8 recites, "The system of claim 1 including more than 10 Gbytes of semiconductor memory". This claim is interpret to be claiming a memory capacity in the range of 10 Gbytes to infinite

gigabytes. This is certainly not what the applicant disclosed in Page 39, Line 16 of the specification whereas "a typical system approximately 10.6 Gbytes of data is required….". Therefore, the specification lacks an antecedent basis for the claimed range of "more than 10 Gbytes" (i.e. greater or equal to 10 Gbytes).

Claim 9 is objected to under 37 CFR 1.75(c) as being an dependent claim that fails to further limit the independent claim from which it is dependent upon.

Claims 7, 12 15, and 17 are objected to under 37 CFR 1.75(a) as failing to particularly point out and distinctly claim the subject matter which applicant regards as his invention.

Regarding the term "layer group" in Claim 7, it is clear that the applicant's disclosure that "layer group" means the plurality of printheads designated for printing a specific layer. However, Claim 1, from which Claim 7 is dependent upon, does not provide the antecedent basis to enable the comprehension of "layer group" in this manner.

Claims 12 and 17 recite a first set of material and a second set of material while Claim 1 does not provide an antecedent basis for these materials. It would be proper for these claims to be dependent upon Claim 11, which does provide the basis for the first set and second set of materials.

Regarding Claim 15, Claim 1 failed to provide the antecedent basis for "executes a process". Please amend Claim 1 to include the proper antecedent basis for "a process". Furthermore, "the system reconfigures the subsystem to be capable…." Begs

the question of whether the system will or will not reconfigure the subsystem to perform

process being claimed.

### *Statutory Double Patenting*

5.  A rejection based on double patenting of the "same invention" type finds its support
    in the language of 35 U.S.C. 101 which states that "whoever invents or discovers
    any new and useful process ... may obtain a patent therefor ..." (Emphasis added).
    Thus, the term "same invention," in this context, means an invention drawn to
    identical subject matter.  See *Miller v. Eagle Mfg. Co.*, 151 U.S. 186 (1894); *In re
    Ockert*, 245 F.2d 467, 114 USPQ 330 (CCPA 1957); and *In re Vogel*, 422 F.2d 438,
    164 USPQ 619 (CCPA 1970).

    A statutory type (35 U.S.C. 101) double patenting rejection can be overcome
    by canceling or amending the conflicting claims so they are no longer coextensive in
    scope.  The filing of a terminal disclaimer <u>cannot</u> overcome a double patenting
    rejection based upon 35 U.S.C. 101.

6.  Claims 1, and 9 through 21 are rejected under 35 U.S.C. 101 as claiming the same

    invention as that of claims of prior U.S. Patent No. 7162324, and 7162325.  This is a

    double patenting rejection.

    Referring to **Silverbrook (US 7162324 B2)**, the scope and content of Claim

    12, which is dependent upon Claim 1 of said patent, anticipates Applicant's Claim

    10.

    Referring to **Silverbrook (US 7162325 B2)**, the scope and content of Claim 7

    of **Silverbrook (US 7162325 B2)**, which is dependent upon Claim 1, anticipates

    Applicant's Claims 1 and 9.

    The scope and content of Claim 1 of **Silverbrook (US 7162325 B2)**,

    anticipates Applicant's Claims 11 and 16.

The scope and content of Claim 8 of *Silverbrook (US 7162325 B2)*, which is dependent upon Claim 1 of said patent, anticipates Applicant's Claim 12.

The scope and content of Claim 9 of *Silverbrook (US 7162325 B2)*, which is dependent upon Claim 1 of said patent, anticipates Applicant's Claim 13.

The scope and content of Claim 10 of *Silverbrook (US 7162325 B2)*, which is dependent upon Claim 1 of said patent, anticipates Applicant's Claim 14.

The scope and content of Claim 11 of *Silverbrook (US 7162325 B2)*, which is dependent upon Claim 1 of said patent, anticipates Applicant's Claim 15.

The scope and content of Claim 12 of *Silverbrook (US 7162325 B2)*, which is dependent upon Claim 1 of said patent, anticipates Applicant's Claim 17.

The scope and content of Claim 13 of *Silverbrook (US 7162325 B2)*, which is dependent upon Claim 1 of said patent, anticipates Applicant's Claim 18.

The scope and content of Claim 14 of *Silverbrook (US 7162325 B2)*, which is dependent upon Claim 1 of said patent, anticipates Applicant's Claim 19.

The scope and content of Claim 15 of *Silverbrook (US 7162325 B2)*, which is dependent upon Claim 1 of said patent, anticipates Applicant's Claim 20.

The scope and content of Claim 16 of *Silverbrook (US 7162325 B2)*, which is dependent upon Claim 1 of said patent, anticipates Applicant's Claim 21.

### Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form

the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, m ore than one year prior to the date of application for patent in the United States.

8. Claims 1, 2, 7, 9, 11 through 13, and 17 are rejected under 35 USC 102 (b) as being

anticipated by *Penn et al. (US 6169605 B1).*

      Regarding Claim 1, A three dimensional object creation system that prints

objects layer by layer [Column 3, Row 51 through Column 4, Row 14], the

system including a plurality of printheads [Column 16, Rows 35 through 45,

Printhead 20 and Printhead 670 of integrated Printhead 650], the system printing

at least part of each of multiple layers simultaneously [Figure 12, where it is

clearly shown that Printerhead 20 and Printhead 670 are dispensing materials

simultaneously], the system including semiconductor memory [Column 6, Row 61

through Column 7, Row 5] and wherein data defining at least one layer is stored

in the semiconductor memory [Column 9, Rows 57 through 65].

      Regarding Claim 2, wherein data defining all of the layers is stored in the

semiconductor memory [Column 9, Rows 57 through 65].

      Regarding Claim 7, it is taught in [Column 9, Rows 57 through 65] that the

microprocessor dictates the configurations of printing to which each printhead

must follow to execute printing. Therefore, it serves as datalink between

printheads.

Regarding Claim 9, wherein the system includes a plurality of printheads [Column 16, Rows 35 through 45, Printhead 20 and Printhead 670].

Regarding Claim 11, wherein the printheads are configured to enable printing of at least two different materials in at least one layer [Column 16, Rows 35 through 45, Printhead 20 dispenses conductive object material 25 while Printhead 670 dispenses insulative support material 35].

Regarding Claim 12, wherein the printheads are configured such that at least one of the layers may be printed with a first set of materials [Column 16, Rows 46 through 56, where Printhead 20 filled in material 25 in one layer while Printhead 670 fill the rest of the layer in with material 35] and at least one other of the layers may be printed with a second set of materials [Column 16, Rows 49 through 56, layers (that is layers other than the current layer Printhead 20 had just dispensed material 25) between the conductive lines receive material 25 from Printhead 20 thereby connecting the conductive lines of different layers], and wherein the first and second sets are not the same [Material 25 is conductive object material, Column 9, Rows 40 through 45. Material 35 in Column 16, Rows 22 through 23, Column 8, Rows 4 through 8].

Regarding Claim 13, wherein the system is configured to enable at least one first printhead that is initially configured to print at least part of a first layer to be dynamically reconfigured to print at least part of a second layer [Column 11, Rows 8 through 38, where it is taught Printhead 20 is initially configured by microprocessor control system to print a first layer. Upon completion, it is loaded

with data for the second layer, or dynamically reconfigured to print the next layer].

Regarding Claim 17, the system including at least two printheads, a first one of printheads printing a first material and a second one of the printheads printing a second material, the first material being cured by a first method [Column 10, Rows 24 through 27, Material 35 melts at a lower temperature than Material 25 therefore requiring a different curing method] and the second material being cured by a second method and wherein the first and second methods are different [Column 10, Rows 30 through 35, the first method of curing is by UV light and second method of curing is by fiber optic directed at the dispensing position whereas curing by UV light is different from curing by fiber optic].

## *Claim Rejections - 35 USC § 103*

9.  The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. Claims 3 through 6 and 8 are rejected under 35 USC 103 (a) as being unpatentable

over the combined teachings of *Penn et al. (US 6169605 B1)* and *Klaus et al. (US*

*6056455 A)*.

   *Penn et al. (US 6169605 B1)* teaches the three dimensional object printing

system of Claim 1 from which these claims are dependent upon. However, it does

disclose printheads with individual memories.

   *Klaus et al. (US 6056455 A)* teaches these elements.

   Regarding Claim 3, wherein each printhead includes at least some of the

semiconductor memory [Referring to Figure 4, where it is shown that each printhead

includes a plurality of registers whereas these registers are obviously made by

semiconductor materials].

   Therefore, it would've been obvious to one ordinarily skilled in the art to

modify the printheads of *Penn* with semiconductor memories as taught by *Klaus* in

order to provide printheads with higher nozzle firing rate [Column 1, Rows 12

through 20 and Rows 49 through 57].

Regarding Claim 4, while *Klaus et al. (US 6056455 A)* teaches printhead with semiconductor memory, *Penn et al. (US 6169605 B1)* teaches in [Column 11, Rows 8 through 20] that the printhead is configured to print a first layer.

Therefore it would've been obvious to one ordinarily skilled in the art to modify the printhead of *Penn* with memories from *Klaus* to print a first layer according to configuration lay out by CAD to enable printing at an efficient rate.

Regarding Claims 5 and 6, *Penn et al. (US 6169605 B1)* further teaches in [Column 11, Rows 26 through 38] that after printing of one layer is finished, the data for the next layer is loaded. Therefore, by modifying the memory of *Klaus* into printhead of *Penn*, the next layer of data is being loaded into the memory of the printhead as soon as the printing of first layer is successfully concluded. The modification and motivation to combine is the same as in Claim 3 or Claim 4.

Regarding Claim 8, the problem *Klaus et al. (US 6056455 A)* attempted to solve the problem of handling extremely high data rate with limited bandwidth in a system of between 4 to 1200 material dispensing nozzles by providing printheads with memory [Column 2, Rows 57 through 65] and decoder to decode incoming sequence of encoded data. With data rates around 120 Mb/sec (15 MB/sec) to 480 Mb/sec (60 MB/sec) [Column 1, Rows 22 through 31]. The data that needed to be buffer before printing can start easily reaches the range of gigabytes.

While *Klaus et al. (US 6056455 A)* does not teach that semiconductor memory must be over 10 GB, it would motivate one ordinarily skilled in the art to

specify a memory capacity in the gigabyte range to handle the immense amount

data for a system with number of nozzles between 4 and 1200.

Therefore, it would've been obvious to one ordinarily skilled in the art to

configure the memory of the printheads to have a capacity in the range of 10 GB in

order to enable the plurality of printheads to execute the enormous amount of print

jobs.

11. Claims 10 and 16 are rejected under 35 USC 103 (a) as being unpatentable in view

of **Penn et al. (US 6169605 B1)**.

Regarding Claim 10, wherein each layer is defined by a plurality of voxels

arranged in a regular array and wherein the voxels of each layer are printed so as to

be offset by half a voxel relative to the voxels of adjacent layers in a first direction, a

second direction perpendicular to the first direction or both the first and second

directions [According to Column 19, Rows 35 through 40, the CAD database keeps

record in the memory the location corresponding to three dimensional array of

voxels base on x-y-z coordinate map. Accordingly, the control program interrogates

every other voxel in the database to determine whether or not the targeted voxel

should be fill with material 25 or material 35. Specifically, from Column 19 Row 45

through Column 20 Rows 64, it is taught the interrogation process takes a targeted

voxel (voxel of interest), and checks its distance to the imaginary shell in x direction,

y direction, and z direction. After a determination of distance is made base on user

define variable t, a decision is made whether the targeted voxel is to be fill with

material 25 or material 35, and an increment of two is taken to go over to the next

voxel where the interrogation will be perform all over again. Therefore, the reference

explicitly teaches that voxels, which physically existed on a layer-by-layer basis, are

projected within the database as arrays of three-dimensional objects offset by a

standard incremental distance from each other in the x direction, the y direction, and

z direction.]

While **Penn et al. (US 6169605 B1)** does not teach that the offset has to be one-half voxel, but it enable one ordinarily skilled in the art to arrange voxels to be offset by a standard value.

Therefore, because all offsets of one-half voxel is a standard incremental distance, it would've been obvious to one ordinarily skilled in the art to offset the voxel by a distance of one-half voxel in order to properly arrange the voxels from layer to layer as a three-dimensional array of voxels and to enable an improvement in reliability and method of producing three-dimensional objects [Column 3, Rows 46 through 49].

Regarding Claim 16 wherein a first printhead is actively maintained at a first temperature and a second printhead is actively maintained at a second temperature [It is taught in Column 9, Rows 16 through 34, Materials 25 and 35 are solid and dry at first. Then it is melted down in heated chambers 84 to be delivered to the printheads. Furthermore, it is taught in Column 16, Rows 18 through 34 that material 25 comprises conduction material such as aluminum and material 35 comprises a dielectric material such as polycarbonate plastic and etc. This means that material 25 and material 35 have different melting points. Therefore, in order to maintain fluidity of the materials before dispensation, printheads 20 and 670 must be maintain at different temperatures corresponding to the properties of the materials contain therein, as well known in the art of 3D object making.]

While **Penn et al. (US 6169605 B1)** does not explicitly teach that Printheads 20 and 670 must be actively maintain at two different temperatures, **Penn et al. (US**

*6169605 B1)* sufficiently motivates one ordinarily skilled in the art to maintain the two

printheads at temperatures corresponding to the properties of materials 25 and 35

by explicitly stating the difference between materials 25 and 35 [Column 16, Rows

18 through 34] and the need to keep them at a liquid state [Column 9, Rows 32

through 34] before they are to be dispensed onto the substrate.

Therefore, it would've been obvious to one ordinarily skilled in the art to

actively maintain the two printheads at respective temperatures suitable to keep

materials 25 and 35 in a liquid state before dispensation in order to enable the

successful creation of 3-Dimensional Objects via dispensation of materials in a liquid

state onto targeted substrates.

12. Claims 18 - 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over the

combined teaching of *Penn et al. (US 6169605 B1)* and *O'Connor (U.S. 5,705,117*

*A)*.

*Penn et al. (US 6169605 B1)* teach the characteristics previously described but

do not teach that a non-printed object can be inserted into the product.

In a method to produce components via stereolithography, *O'Connor (U.S.*

*5,705,117 A)* teaches that a non-photopolymer component or item can be inserted

into the prototype product being manufactured. Examples of insert members include

metal or ceramic members (Column 2, Rows 38 - 42). As in other stereolithography

systems, there is a CAD design used to create the prototype (column 6, Rows 24 -

25). A microprocessor is programmed to translate the CAD data to create the

appropriate STL files, from which the prototype will be manufactured, layer by layer

(Column 6, Rows 38 - 42). The prototype is partly built and then, the system is

stopped, at which time the metal or ceramic insert is placed into the cavity (Column

6, Rows 45 - 50). This reads on the Applicant's claims that the system include at

least one printhead for printing material to create a printed product, and an object

incorporation device that incorporates inorganic semiconductors into the product

being printed whilst the at least printhead prints the product; and wherein the system

includes at least one object incorporation device that incorporates non-printed

objects into the partially complete product, the non-printed objects not being printed

by the system; wherein an object incorporation device that inserts at least one non-

printed object into at least one cavity created during the printing process, the object

incorporation device incorporating the at least one non-printed object into the at least one cavity during the printing of the respective printed object; and wherein the system includes at least one printhead that prints electrical connections to at least one object incorporated in the products.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the Applicant's invention to modify the system of *Penn et al. (US 6169605 B1)* to incorporate the object incorporation device of *O'Connor (U.S. 5,705,117 A)* for the purpose of inserting a ceramic or metal component into a designated cavity of the prototype, if necessary, depending on what type of prototype is being manufactured.

## *Conclusion*

13. The prior art made of record and not relied upon is considered pertinent to

    applicant's disclosure: US 5198159 A, US 5398193 A, US 6259962 B1, US 6401001

    B1, US 6501663 B1, US 6503831 B2, and US 6658314 B1 for creation of 3D objects

    and US 4567570 A, US 5049898 A, and US 6431704 B1 for printhead with

    semiconductor memory.

14. Any inquiry concerning this communication or earlier communications from the

    examiner should be directed to Brian P. Werner whose telephone number is 571-

    272-7401 and Richard Z. Zhu whose telephone number is 571-270-1587. The

    examiners can normally be reached on M-F, 8:00 - 4:30.

    Information regarding the status of an application may be obtained from the

    Patent Application Information Retrieval (PAIR) system. Status information for

    published applications may be obtained from either Private PAIR or Public PAIR.

    Status information for unpublished applications is available through Private PAIR

    only. For more information about the PAIR system, see http://pair-direct.uspto.gov.

    Should you have questions on access to the Private PAIR system, contact the

    Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like

    assistance from a USPTO Customer Service Representative or access to the

    automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-

    272-1000.

RZZ                                                              Richard Z. Zhu
4/9/2007                                                         Assistant Examiner
                                                                 Art Unit 2609
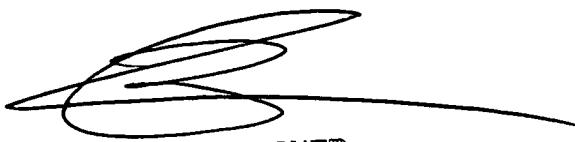
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SUPERVISORY PATENT EXAMINER